A grounded theory study of meta-attention in golfers

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This study sought to construct a theoretical understanding of meta-attention among golfers. Eight male golfers (7 competitive-elite and 1 successful-elite) were interviewed about their experiences of attentional processes in competitive golf. A Straussian grounded theory approach was used throughout the research process, and interview transcripts were analysed using open, axial and selective coding. Results indicated that meta-attention is resource-based with metacognitive reflections of logistic and shot resources that facilitate attentional control. Attentional control required successful target selection, consistent pre-shot routines and consistent post-shot routines. Failures in wider or immediate resources or failure to initiate control routines, can lead to internal distraction. The emergent theory provides an understanding of the function of meta-attention in golf performance that can be used by golfers, coaches or psychologists to improve attentional strategies.

Keywords: metacognition; attentional control; attention-regulation; optimal performance; attention

A GROUNDED THEORY OF META-ATTENTION AMONG GOLFERS

Meta-attention is a form of metacognition which relates to an individual's knowledge and awareness of the operation and controllability of their attentional system (Miller & Bigi, 1979). The study of meta-attention among sports performers allows researchers to understand how athletes focus and refocus their attention. Although attention research is one of the fastest growing fields in cognitive psychology (Moran, 2011), there remains some ambiguity about the functionality of attention, such as how an athlete can re-focus should there be a breakdown in selective attention (i.e., concentration). By exploring meta-attention among athletes, it should be possible to understand how athletes direct and misdirect their attention (Moran, 1996).

To contextualise meta-attention, it is first necessary to look at metacognition. Metacognition is conceptualised as an individual's insight and control over one's cognitive processes (Flavell, 1979). Tarricone (2011) has expanded metacognition to a tripartite construct including: knowledge, control and monitoring. Metacognition is identified as a pathway to understanding expert performance in sport (MacIntyre, Igou, Campbell, Moran, & Matthews, 2014). MacIntyre et al. (2014) constructed this understanding on the assumption that experts possess knowledge of an expected standard of performance, and an on-going metacognitive monitoring system alerts a performer of any deviation from this standard, initiating a self-regulatory strategy in an attempt to return performance to an expected standard. As expert performance is typified by increased automaticity, less demand is placed on working-memory (Beilock & Carr, 2001), freeing space for metacognitive assessment and implementing a strategy to achieve one's goals (MacIntyre et al., 2014). Elite athletes are said to be experts in their motor-skill execution as well as possessing expertise in planning, metacognition and reflection (MacIntyre et al., 2014). A few studies evidence the proficiency of higher-level cognitive functioning in experts compared to non-experts. For example, McPherson (2000)

compared the planning strategies of highly skilled and beginner tennis players. Players reported up to three times as many planning strategies than their lesser skilled counterparts. These strategies included: attaining goals within the match, specific strategic actions and conditions when such actions are most appropriate, regulatory statements about monitoring performance, and a description of how to perform strategic actions. Conversely, novices reported a disproportionate number of task-irrelevant thoughts, rather than strategic thoughts to help them gain an advantage in the match. Gould, Eklund and Jackson (1992) showed that during their best performances, Olympic Wrestlers reported clear use of strategic planning and less so in their poorer performances. Optimal performances featured total concentration, optimal intensity, confidence and, cognitions involving strategy, focusing and re-focusing techniques. Taken together, these findings indicate the role of focusing on the right things and deploying strategies whilst competing becomes clear. Additionally, the implementation of strategy use seems to be facilitated by an in-built monitoring system, which could be interpreted as an "executive" cognitive process – or metacognition, albeit this evidence is indirect.

The original understanding of meta-attention has its roots in education, with research showing that younger children perceive their attention to be controlled by external variables whereas older children possess an awareness of internal variables that they can control to direct their attention to maintain task relevant focus. Research shows that older children are more able to perceive distractors, and are therefore in a better position to control arising distractors, so not to disrupt task performance (Loper & Hallahan, 1982; Miller & Bigi, 1979). Attention may be lost without an environmental (i.e., external) distractor present, instead a mind wandering to task irrelevant thoughts (i.e., internal) can cause an individual to lose concentration (Moran, 1996; Moran, 2011). The mechanism in place which realises

sufficient attention is not directed to the task at hand becomes an area of interest, because it is this monitoring system, searching for internal distractions, which subsequently allows the performer to re-focus on the task at hand should attention be misdirected (Moran, 1996). The effectiveness of this apparent refocus, however, is likely linked to the efficiency of the individual's cognitive processing (Moran, 1996).

Meta-attention can be placed under the metacognitive umbrella which suggests that higher-skilled athletes have a greater capacity to reign in a wandering mind by implementing suitable strategies to re-focus on task relevant cues allowing for successful control of attention. Research exploring higher-order attentional processes during performance (e.g., meta-attention) is lacking; however, some insights into metacognition and attention have been provided within endurance sport settings. For example, Brick, MacIntyre and Campbell (2015) used content analysis to explore attentional focus and cognitive control in elite-level endurance runners. In ten interviews, Brick and colleagues (2015) showed that planning, monitoring, reviewing and evaluating and metacognitive experiences were fundamental to effective cognitive control and strategy in running performance. Brick, Campbell, Sheehan, Fitzpatrick, and MacIntyre (2018) indicated that runners' attentional focus improved through metacognitive proficiency as they became more experienced. Although these findings lends support to the link between metacognitive proficiency and expert performance (e.g., MacIntyre et al., 2014), it remains bound in context specificity. Endurance activities are externally paced and continuous, and the self-regulated metacognitive processes identified in this research are entwined with this (e.g., pacing strategy). Therefore, gaps in knowledge that pertain to attentional processes at the 'meta' level within golf remain. In particular, the internal variables that the meta-attentional system monitors for remains underexplored in golf. Nevertheless, the capacity to self-regulate where competitors cannot receive coaching

instructions while they compete is imperative. Elements of these findings lend themselves well to the current study as during competition golfers must monitor performance to know at what time, and how, to execute certain skills, without coaching or external instruction.

Some theoretical insights into an attentional monitoring system, and attempts to control attention are provided through ironic processing theory (Wegner, 1994). Ironic processing outlines the paradox of attempts to control a wandering mind may cause it to wander further. In ironic processing theory, Wegner (1994) outlined that under anxiety or cognitive fatigue, an individual's attention is directed towards signs of threatening stimuli as this monitoring system requires less resource than the operating process. Attempts to regain control of a wandering mind, ironically, lead to the very behaviour the individual wanted to avoid. The ironic effects of displaying the behaviour sought to be controlled has been shown within sports psychology literature including golf putting performance. For example, Wegner, Ansfield and Piloff (1998) who showed that under cognitive load and avoidant instructions the tendency to hit the ball past the target increased significantly. Alternative explanations of debilitative effects of cognitive control, points towards overcompensation taking place. In golf putting studies de la Pena et al., Murray and Janelle (2008) and Toner, Moran and Jackson (2013) showed the mediating role of skill-level, indicating that higher skilled performers were less likely to succumb to avoidant instructions related to kinematic changes. However, the direction of missed putts was indicative of overcompensation, rather than ironic processing. The results from these studies indicate that an athlete ought to direct attention to relevant cues without using avoidant self-instruction. This process, however, might be compromised by an athlete's metacognitive proficiency – the athlete's capability to draw on and select the best cognitive strategies for a given task, therefore this warrants further exploration through a meta-lens.

Further insights into the breakdown of attempts to control attention are outlined by Attentional Control Theory (ACT) (Eysenck, Derakshan, Santos, & Calvo, 2007). ACT (Eysenck et al., 2007) focuses on the debilitative influence anxiety can have on attempts to control attention, thus offering some insights into why athletes may become distracted. The performance arena is highly pressured and athletes are judged on their performances. According to ACT, worrying about the outcome disrupts efficient attention control, increasing the distractibility as threatening stimuli distract an individual by overriding goal-directed attention. Studies within sports psychology have supported ACT hypotheses that pressurised situations lead to a reduction in goal-directed attentional control and a reduction in performance (Wilson, Wood, & Vine, 2009). Developing an understanding of meta-attention can provide greater detail on the internal stimuli the monitoring process searches for, and can be a pathway to reducing the debilitative effects of anxiety on performance.

In golf skill execution occurs intermittently, therefore the attentional processes involved can be expected to differ from open externally-paced events. The inaction between shots may suggest frequent changes in attentional focus which can offer insight about how attention is voluntarily controlled during a performance. The current study examines golfers' knowledge of their attention to create a theory of meta-attention that is relevant to a sports setting. By gaining an understanding of golfers' knowledge of their attentional system more can be understood about the occurrence of internal distractions within a closed self-paced sport. Life story interviews (Atkinson, 1998) focused on the participants' golfing career to explore their knowledge of, and experiences of, controlling their attentional system to elucidate incidences of meta-attentional accuracy and inaccuracy. Life story interviews cover what has happened to a person and can cover from their birth to the present day, before and beyond (Atkinson,

1998). Therefore, these interviews provide insight into instances of attentional control with optimal and sub-optimal outcomes. Developing this theoretical understanding can possess practical implications by helping guide interventions with the aim of reducing internal distractibility. Thus, findings can benefit performers, coaches and psychologists. By successfully doing this, Moran's (1996) two-decade old call for meta-attentional research is answered. It is intended that the resulting grounded theory will provide insights into sources of internal distractibility and the best practice for the control of attention.

Method

Methodological Congruence

Based on issues identified in grounded theory studies in sports psychology that has seen the extent to which researchers follow "true" grounded theory methodology questioned (Holt & Tamminen, 2010a; Holt, 2016; Holt & Tamminen, 2010b; Weed, 2009; Weed, 2010; Weed, 2017), Straussian grounded theory (Corbin & Strauss, 2008) is used in its entirety as a 'total' methodology (Weed, 2009). This addresses the criticism that sports and exercise psychologists 'cherry-pick' elements of grounded theory rather than using it in its entirety (Holt, 2016). The selection of Straussian grounded theory is driven by the lead researcher's ontological and epistemological beliefs that are consistent with the post-positivist position (Weed, 2009). Grounded theory is a suitable methodology where pre-existing theory within the context is inadequate (Corbin & Strauss, 2008), because a theoretical account of meta-attention in sport has yet to be meaningfully performed, a grounded theory methodology is well matched to the research gap.

Sampling and Participants

Initial recruitment adopted purposive sampling using an already available network of three golfers, that is, a sample who have knowledge and experience of the phenomenon of interest was selected. As data collection progressed recruitment evolved into theoretical sampling,

that is data was driven by the evolving concepts and established patterns and variation within the data (Corbin & Strauss, 2008; Strauss & Corbin, 1998). For example, initial recruitment golfers had some tour experience, however, as collection and analysis progressed players who had amassed greater tour exposure were recruited. This began to show the differences and similarities in each of the emergent categories. The final sample consisted of 8 male competitive golfers. However, the researchers did not explicitly seek a male only sample; rather this was the sample available at the time of data collection. One player had previously played full-time on the European Tour for a number of years, winning two European Tour events. Six players had consistently played on the Tartan Tour or Europro Tour over a number of years, and one player was a former county level champion and had previous involvement in national age group squads. To ensure this was satisfied names were cross-checked with relevant Order of Merit tables. Therefore these participants were considered to be 'competitive-elite' and 'successful-elite' based on criteria outlined by Swann, Moran and Piggott (2015). Because grounded theory aims to be substantive rather than general (Strauss & Corbin, 1998), sampling strove for quality insights over quantity of insights, thus exclusion criteria were applied to non-competitive recreational golfers. In doing so, the credibility of our understanding of meta-attention was strengthened.

Data Collection

Upon receipt of institutional ethics approval, potential participants were identified and contacted by email. Further advertisements for recruitment were placed on Twitter. Communications explained the purpose of the study, and that it would entail an interview lasting approximately one hour. Those who corresponded and expressed an interest in the study were contacted to arrange a mutually convenient time and location to meet, in most cases this was at the home club of the participant. All participants provided informed consent prior to the interview. As mentioned previously, interviews followed a life story format and these were focused towards participants' experiences in competitive golf settings, such as

reflections on tour events. Interviews took the form of semi-structured career-based interviews, that were conducted in an effort to gain rich descriptions and insights into perceptions of attentional thoughts and control that had been experienced at different points over the course of careers, rather than a mere snapshot of a single event. All of the interviews were conducted by the lead researcher.

An interview guide was developed to gain a detailed understanding of participant's metacognitions, this had the additional function of facilitating the interview process. The interview guide used was designed to be fluid, and act as a gentle steering exercise, rather than something that would be vigorously referred to and was something that evolved as the research process went on. Interviews used open-ended questions and adopted a conversational tone as this allowed for themes and points of discussion to emerge naturally and did not constrain responses from the interviewees. Questions began by addressing themes of concentration, attentional control and distraction. The emergent data and on-going analysis shaped subsequent interviews as the emergent theory began to drive later interviews (Corbin & Strauss, 2008; Strauss & Corbin, 1998), later interviews were more directed and sought to delve into participants' perceptions of their resources, such as social support, as these concepts influenced the outcome of attentional control. Eight interviews were conducted and lasted between 43 and 111 minutes (M= 62.13, SD= 21.33) that were digitally recorded using a Dictaphone and were transcribed verbatim by the lead researcher.

Data Analysis

Within grounded theory, the process of data collection and analysis is interwoven with each interview informing the next. To facilitate this process, the lead researcher gained a greater sense of familiarity with the data by listening to audio recordings between interviews and reading transcripts several times. Analysis took place between each interview and was conducted by the lead researcher; specifically this process began with *open coding*, which

entailed identifying initial concepts within the data and developing categories. Open coding led to initial development of concepts relating to meta-attention within golfers (e.g., how emotions would influence attention). These categories were then refined through *axial coding*, which helped illustrate the relationships that existed between categories and their subcategories (e.g., whether these linked to immediate factors that could impact a specific shot or whether these were more general factors that would impact an overall game). As suggested by Corbin and Strauss (2008) during this stage draft models depicting inter-category relationships were sketched; encouraging the researcher to think about the role of each concept and the interactions between them (see figure 1 for an early draft model). Additionally, axial coding was used to steer the research to investigate categories that required further development to research saturation. Axial coding refined the categories during which the *constant comparative method* was used, this forms a central part of grounded theory (Holt & Tamminen, 2010a; Weed, 2009) and entails comparing incidents across interviews for similarities and differences; providing depth to each concept. Saturation was deemed to have been achieved when no further distinct insights on the operation and controllability of attention were offered in interviews (Corbin & Strauss, 2008), after which data collection was halted.

Coinciding with the process of *open* and *axial* coding was the use of memos that were utilised to track the lead researcher's thoughts about the data, questions asked of the data and to track the development of the theory; encouraging micro-analysis (Corbin & Strauss, 2008). A shortened example of a memo relating to the role of the caddie, that later formed part of the role of others subcategory, is as follows: *what process is being described?* (The caddie performs several roles in concentration such as between shots facilitating switching off); *how can it be defined?* (The relationship and understanding between player and their caddie); *how*

is this process developed? (The process develops as a relationship between a player and their caddie); *how does the participant act in this process?* (The participant is less distracted when positively perceiving a relationship between caddie themselves); *when, why and how does the process change?* (The process can change dependent on the relationship with their caddie, a new caddie can cause anxiety and distract the golfer). The notes gathered from memos guided *selective coding* which entails a process of arranging and integrating categories and concepts to form a theoretical framework.

To achieve methodological rigor, the researchers aimed to remain objective and recognize bias throughout the research process. This was achieved by checking assumptions with incoming data and following grounded theory in its entirety (Weed, 2009). In addition, consideration was made to the coding procedure adopted. Specifically, Smith and McGannon (2018) outlined that traditional inter-rater reliability used in qualitative sports and exercise psychology research was ineffective for ensuring reliable research, therefore, researchers should seek an alternative framework for establishing rigour in qualitative studies. To overcome such issues Smith and McGannon (2018) presented alternative inter-rater reliability guidelines, the researchers opted for intercoder reliability (MacPhail, Khoza, Abler, & Ranganathan, 2016). Because of the guidelines' consistency with the post-positivist position held by the lead researcher (Smith & McGannon, 2018). The first author (a PhD student) and second author (director of studies) devised a coding frame prior to independently coding the research. The lead researcher completed coding for each of the transcripts, and the second author coded a sample returning a Cohen's kappa rating of .80. Following Burla et al.'s (2008) guidelines this is 'perfect' agreement. In the cases of disagreement, codes were discussed between the first and second author and in all cases the final code used was that identified by the first author.

Further rigor was achieved through a post-hoc evaluation of the resultant grounded theory. To do this, quality criteria outlined by Weed (2009, p.509) was used. Consistent with Straussian realist ontology, the post-hoc evaluation related to how the concepts and the theory generated would, and were perceived to, "fit" the nature of attention as a resource based phenomenon; "work" by offering an analytical explanation of concentration in golf performance, i.e., how an athlete focuses and re-focuses; "relevance" for use in a practical setting to improve concentration in golf; and "modification" so the resultant grounded theory can be updated and amended through future research and new knowledge gained. Here, it should also be noted that the study prioritized meaningful findings related to golf, rather than generalizable findings related to a wider sports context.

Results

The results are drawn from collated interview responses from 8 competitive golfers regarding their knowledge and awareness of their attention. The findings indicate attentional metacognitions made up of logistic factors, seen as planning, and shot factors, seen as monitoring, provide golfers with resources to influence their attentional control. Thus, attention-related metacognitive evaluations are a catalyst for attentional control as they provide the platform to initiate control strategies. If conditions are met, optimal attention control then requires an external target selection, a consistent pre-shot routine and a consistent post-shot routine. If each level (i.e., metacognitive and control) is satisfied optimal control response occurs, however sub-optimal control responses (i.e., distractibility) occur when a failure occurs at any stage of the process. *Figure 1.* is a grounded theory model that displays a schematic representation of the emergent concepts and their relationships. As can be seen in the model, this is represented as a bottom-up process with progression from logistic metacognitions towards shot-related metacognitions that facilitate attentional control.

Negative evaluations at either of these factors and subsequent failure to implement strategies to overcome these can result in sub-optimal outcomes. Detailed insight into each component will now be undertaken.

<Insert *Figure 1.* here>

Underpinning Factors

Psychological skills.

The underpinning psychological skills that are present at each stage of attention control were indicated throughout each interview. In line with the understanding of meta-attention's location within metacognition self-regulatory behaviours, particularly self-knowledge provided an anchor for evaluation and control stages and something that would determine the success of attempts to control attention, putting knowledge into action. A comment from one of the golfers interviewed embodied the individualised nature of psychological skills, 'Everybody is different, so it's what works for you is the key'. Self-regulatory skills refers to altering inner states or responses including actions, thoughts, feelings and task performance allow an athlete to find what works for them (Baumeister & Vohs, 2007). One golfer described this key process as, '…finding your own sport DNA'. Psychological skills and strategy are not a one-size-fits-all approach therefore it is central that the individual understands what works best.

Attentional beliefs.

Participants converged on the idea of focusing on the right things (i.e., stimuli relevant to successful shot execution), was described as an ability to 'concentrate', and was conducive of effective attention, one participant exemplified this in their comment:

> I suppose, for me, being focused, being concentrated on what you are doing. Attention to detail, taking into account everything. In golfing terms, for me it's going into every

> last detail, so I suppose if you're paying attention to everything round about you, you're looking at the lie, you're at the conditions in terms of the wind, you're thinking about where you're landing the ball rather than just standing knowing your yardage taking a club and hitting it, you're taking a bit more into consideration for your shot.

Furthering the concept that there are helpful and unhelpful stimuli within the attentional system, and with it attention is movable to the most helpful stimuli for performance was described by another participant who used an analogy to describe attentional control:

> …you heard me talking about walking out the zone, I'd be turning my magnalight so the that my attention was everywhere, but when I went into that little zone 20 yards from getting to my ball I'd be walking away from the players, starting to get my attention on what I'm trying to do…

The magnalight analogy can be seen to tie in with Posner's (1980) spotlight hypothesis, and suggest an accuracy to the attention process. The findings in this study indicate that to successfully control their attention golfers must value the ability to move attention, holding the belief that their concentration is shifted frequently throughout a performance has been shared.

Logistic Resources

A major component identified within meta-attention was found to be a wider evaluative stage that refers to factors that require satisfaction, but may not have a direct influence on the immediate shot.

The role of others.

When free from internal distractions, golfers positively perceived the role of others and the support that this provides. A golfer interviewed emphasised the importance of receiving support from others:

> the top players have got a team about them…they've got all these people about them…they might have 6, 7 people in their team, all geared towards making that guy a good golfer, the best he can be

Support networks varied between golfers, for reasons such as finance, the appraisal of support network appears to influence meta-attentional accuracy. Central to the role of others was the prevention of feelings of isolation that would lead to decreased meta-attentional accuracy. According to one of the golfers a positive golfer-caddie relationship prevented isolation, 'Yeah, once you're out on the golf course it sort of feels like you're a team rather than you're standing out there alone'. This is seen to align with previous research on perceived support in golf that indicates a positively perceived support increases the situational control and is positively associated with challenge appraisals leading to more performance outcomes (Freeman & Rees, 2009). Furthermore, improvements to perceived social support can improve golfing performance (Freeman, Rees, & Hardy, 2009). Trust and familiarity formed a basis for the role of others, without these present in a golfer's relationships, meta-attentional accuracy would be weakened.

> I just had guidelines with him… other caddies would be more forceful, if you like, I didn't get on well with that, but certainly having someone you've got a good relationship with on the bag or you have a strict relationship psychologically that helps a lot because I was always more comfortable with him on the bag.

Significantly, the findings demonstrate that insecurities surrounding a support network lead to increased distractibility in competitive golf. In the present study, participants noted that trust and a mutual understanding held by the golfer and support of the role played by the support giver formed the basis of the perception of support.

Training.

A positive evaluation of training was consistently identified as important for reducing distractibility, that required an absence of concerns about the quality of training and the skills that had been rehearsed prior to competition. Golfers noted that making too many changes mid-season could divert attention away from the most task relevant stimuli as athletes would become caught up in monitoring and ensuring their desired change within performance is implemented, thus distracting them. One participant outlined this, and provided information on how this informed their decision-making in their early career:

> [it is about] doing the right work at the right time. So when you have a gap of November to February, 'right what is it I'm trying to do to my technique, is there a physical limitation which is preventing me from moving in that fashion?' You start to look at service providers etc. and I think if it had been explained to me a little more, or explained to me at all in that age group 16-19 to 20 I would have understood to prepare at the right points in the season.

This study found that positive evaluation of training was facilitative of attentional control as it enabled golfers to feel suitably prepared for events. The findings demonstrate that for accurate attentional control a suitable amount of pre-event planning must take place, and the role of training is expanded further to wider-level planning as off-season training is demonstrated to impact attentional accuracy.

Organisation.

Being suitably organised for an event would reduce a potential source of distraction maintaining attentional accuracy on stimuli most relevant for performance. Responses regarding organisation related to pre-event preparation, specifically what was in the bag. One golfer detailed the role of organisation has in their attention and reducing distractibility:

> What's in the bag, what have I got to eat and drink in the bag, massively important…so I don't need to worry about that, that is something else less to think

> about you know there's nothing worse than, shit I couldn't get enough water this morning to put in my bag, or there's not enough water on the course, I couldn't find the bars I like for the course, so the stuff in my bag I don't like, and that's a distraction, so your attention is on that.

The present study shows that failure to have adequate organisation and preparation for events (e.g., what goes in the bag) can lead to internal distractions experienced by golfers. Knowledge and reflections on preparation helps the golfer in future events, improving the accuracy of their meta-attention.

Financial.

The role of finance within competitive golf has been highlighted by the participants as an important consideration for consistent levels of optimal attention across events. Participants therefore discussed the importance of securing a stable financial footing through the likes of sponsorship monies to sustain participation in tour golf. A golfer who positively evaluated their financial footing was free from concerns that would otherwise distract the golfer. This sentiment was explicitly laid out by several of the golfers:

> If you know all the financial stuff is taken care of and you know all need to do is go out and play good golf, your mind is totally clear and it's a lot easier than if you're say trying to think about what you're doing that night travel wise and all that sort of stuff. That takes a lot of your concentration away.

The findings from this study suggest that financial concerns reduce the accuracy of meta-attention as concerns that are present become internal distractions. As the above quote outlines, positive evaluations of financial support appears to reduce financial-based anxiety, allowing for greater attentional accuracy.

Game Situation

A core component to meta-attention in golf is the game situation that can be read as lie of the shot as this continually updates with each shot. Participants described the role stress can play within the game situation, and the influences this can have on the attentional process. Internal distractions can occur when a golfer perceives their performance to differ from the standard expected, during that the golfers are occupied by thoughts on previous shots and their implications. The following quote illustrates the negative knock-on effects thinking about previous 'bad' shots can have:

> …I had a bad hole and I was thinking about trying to not have another bad hole, so then I almost played defensive.

As well as thinking back, thinking too far ahead is identified as a hindrance for performance, emphasising the importance of maintaining thoughts on the current shot. As professionals, many of those interviewed are involved in coaching and mentoring roles, and this forms a key consideration to their teaching as one of the interviewees outlined:

> …I drum it into the youngsters coming through because they are the ones that will tell their pals 'oh am level after 6 holes', 'this is my best-ever after 9', next thing you screw it up on the back 9 because you're score orientated. So, I think your focus, your attention has got to be on as much as you can just on the task at hand, which is the next shot.

This emphasises the importance that attention needs to be directed to one location – the shot at hand – but that the performance as a whole and thoughts surrounding it can act as a distractor inhibiting optimal levels of focus.

Shot Resources

Within each shot to successfully assert attention control, golfers require resources to achieve this, these concepts take on different value at different times during a performance. The

concepts tied to shot resources can be related to monitoring and included: *Physical Condition, Motivation, Confidence, Acceptance, Emotions, Available Psychological Resources*, and these will now be discussed in turn.

Physical condition.

Golfers consider physical factors including hydration and nutrition as vital resources for meta-attention. Participants demonstrated the need to maintain hydration and hunger within a round as feelings of dehydration or hunger increase the distractibility of a golfer. One of the golfers interviewed provided an in depth insight into the liquid he would require to maintain adequate levels of hydration to prevent feeling distracted:

> Yeah, hydration, nutrition, what is your blood sugar like, for those 4, 4 and a half hours that you are out there, at 15 degrees you're looking at, nah 20 degrees you're looking at a litre and a half of water is the recommendation, 25 degrees 2 litres, 30 degrees, 2 and a half litres, so if you're dehydrated your co-ordination isn't so good.

The findings here indicate that monitoring and awareness of one's physical condition appears to be an important aspect, where feelings of hunger and thirst act as a distraction for the golfer.

Motivation.

The importance of motivation was consistently discussed by the interviewees that pertained to the motivation for controlling attention. At a higher level, motivation had to be focused on winning or performing at a high level, such as progression up the Tour ladder:

> I always feel like I go to the qualifying school for the European tour, that's when it's most heightened because that's the one place I know where if I do well I can step it up a level. The only true drive I have in the game is to play at that higher level. And so, going into those tournaments, that's when my attention is at its highest.

The motivation to perform well and win was contrasted to those at the lower ends of tours where the financial constraints are more pronounced that appears to divert motivation towards finance, rather than a continual drive to progress or win, as one of the golfers explained.

> Their [struggling tour players] mindset is nowhere near the mindset of the top guys because their mindset is trying to make money whereas the higher up guys don't need to make the money so their mindset is just winning the tournaments

Consistent with prior research, high levels of motivation are required for consistent performance in sport (Treasure, Lemyre, Kuczka, & Standage, 2007). In the present study, successful performers have greater internalisation of their motivation that is a key part of self-determination theory (Ryan & Deci, 2000). Successful golfers appear to be able to internalise extrinsic motivators, such as finance, that reduces the internal distraction posed.

Confidence.

Perceptions of confidence were aligned with immediate attentional thoughts. Feeling confident was vital for optimal attention control, whereas limited confidence would see doubts arise and the occurrence of sub-optimal attentional thoughts that act as a distractor. Participants described the importance of maintaining a feeling of confidence going into each shot, and this can be brought about by a good score on a previous hole as one of the participants described:

> If you're on a good wee run of shots – birdies or whatever, the amount of times you see someone hitting a great wee hole a putt for an eagle or a birdie, brilliant feeling when you eagle a hole, after that you go onto the next tee it's amazing to see the amount of times you hit a cracking drive just through feeling good.

Self-confidence is widely recognised as a marker in sporting performance (Woodman & Hardy, 2003). Optimal levels of attention occurred when golfers had high levels of self-

confidence. Confidence allays any doubts that may be held by the golfer. Confidence appears changeable within event and is influenced by each shot played.

Acceptance.

While golfers approached each shot with an aim and target in consideration, they identified that this may not always occur, therefore golfers were more able to accept an outcome (i.e., where the ball goes) if they had fulfilled other elements of the shot. This concept was important for sustained attention and to avoid negative fallout from an unfortunate break of the ball, as one participant exemplified:

> As soon as the ball leaves the club face you can't do anything about it. You can't control the bounce, you can estimate it but as soon as that ball hits the ground it could do anything. It could hit a stone, hit a worm cast, it could do absolutely anything, you can't control it and you need to be more accepting.

Moreover, golfers indicated that the philosophy, *golf is not a game of perfect* (Rotella, 2004) helped them with their approach to shots that did not reach the target location. Furthering this concept, it was important to consider that mistakes occur,

> The big thing is realising you're going to make mistakes. We're always going to make mistakes. If I go and play golf tomorrow, I'll make a mistake at some point, it might be just a wee once or it might be a disastrous one but you learn from it, you learn from it, but you'll do it again, if you get a bad bounce off a bunker into the trees, it's happened before and it'll happen again you know so you deal with it and move on.

A shift towards a mindful, acceptance, approach to each shot was important for the golfers. Parallels can be drawn here with Mindfulness-Acceptance-Commitment (MAC) (Gardner & Moore, 2004; Gardner & Moore, 2012) that is built on the promotion of acceptance of internal states (Hayes, 2004; Hayes, Strosahl, & Wilson, 1999). By accepting there are elements of the shot that cannot be controlled for, a feeling of acceptance, acted as a barrier

for reducing internal distraction, particularly when a golfer may experience an unfortunate bounce after an otherwise faultless execution of their skill execution.

Emotions.

The integral role of emotions when facing each shot was consistently described by the interviewees, where poor emotion-regulation would reduce the accuracy of meta-attention. The distracting role undesired emotions can play was appreciated by the golfers who indicated an awareness to regulate their emotions to facilitate optimal attention.

> Yeah, I find that if you are anxious it can be a struggle from that and personally I tend to do things quicker, and you've got to do the reverse and slow yourself down and give yourself a bit of time, just to take in the situation and if it isn't a good start, just start again and go from there if you can… forget about what has gone on, so that is one of their biggest assets. They tend to forget what they did 2 minutes ago and just move on, which rather than maybe get a wee bit frustrated with yourself and get angry.

The importance of emotion regulation has growing support for performance in sport (Lane, Beedie, Jones, Uphill, & Devonport, 2012) that demonstrates the positive effects of successfully keeping emotions in check. The strategy of regulating emotions serves the function of controlling potential internal distractions stemming from a sub-optimal emotional state.

Experience.

Accumulated exposure to different scenarios was crucial to aid the current shot, optimising attentional thoughts and reducing the distractibility of fear of the unknown. This was particularly important in challenging conditions, as one golfer outlined:

> …difficult weather conditions… 'think of a day, it's a windy day, very windy, so you know it's going to be tough, think about the best round of golf you ever had playing

> in the wind'. If someone said to me that, I'd go, 'right I know I played a round at [event] when I shot the best score of the whole day… it blew an absolute gale… So you put yourself [there], you're now thinking about a really good day.

The present research shows that golfers engage in an on-going in game monitoring that leads to golfers reflections on experiences to inform them in performance. The reflections on experience here act as a buffer to distracting thoughts which may arise during challenging conditions, such as a strong headwind.

Psychological resources available.

A positive perception of possessing sufficient psychological resources was vital for golfers to facilitate attentional control for each shot. The intense levels of concentration required over a round of golf can be draining, and to this end participants talked about the depleting effects of competing on the course over a period of up to five hours:

> Yeah because if you're out on the golf course for 5 hours it's a long time to think about golf and you'd be surprised how drained you can be after a round of golf even though you're only hitting a shot for 30 seconds or something is all you're executing a shot for or around that, but for the whole 5 hours you're just absolutely drained.

A resource, or strength, based model of psychological resources was hypothesised by Baumeister and colleagues (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Vohs, & Tice, 2007). Self-control strength has been shown as a moderator in sports performance involving fine perceptual motor-skills (Englert & Bertrams, 2012; Englert, Bertrams, Furley, & Oudejans, 2015). The previous research indicates that individuals in a state of depletion were more likely to succumb to anxiety and suffer from internal distraction. Increased self-control strength and available resource acts as a buffer, guarding against internal distraction. To mitigate the effects of depletion, maintaining strength, the golfers demonstrated an understanding of an importance to 'switch off' between shots as this would

conserve the resources needed for future shots. The findings presented within the present research suggest that the psychological resources that can be used to concentrate are finite, therefore periods where no particular focus or concentration is important to reduce distractibility.

Control Stage

Built on the resource stage is the control stage that relates to strategies deployed by golfers to control their attention to an optimal focus point. This concept was made up of subcomponents, *target selection, pre-shot routine and post-shot routine*, all of which had to be adequately satisfied or attempts to control attention would have been sub-optimal, allowing for distraction to occur. Each of the above mentioned stages will now be discussed in turn.

Target selection.

Commitment to a target point when is an important component of attentional control in golf. The consensus amongst the participants was that a target should be an external point, that may not necessarily be the flag stick, in order to get the ball to reach the desired location: '…so there's a target there, there's a tree at the background there that's my flag'. In contrast to external focus points, internal focus points were recognised to be unhelpful for performance. Golfers stated that this would be the case in stressful situations where 'you're trying to execute a shot under pressure' the same golfer later added: '…you want to be focusing externally, so on your target or something'. An internal focus can refer to focusing on the mechanics of a swing (i.e., a skill that is automatic) and this too can lead to a breakdown in performance, the issue was encapsulated by one of the golfers interviewed:

> …intuitively you would think it would help, because you would be better equipped to know how things work but in my head it's as simple as a formula 1 driver knowing how an engine works, it doesn't really matter. They need to be, it just doesn't matter.

> If you were to know about it and think about it during the performance it just hurts you.

This is consistent with Masters' (1992) theory of re-investment, that has been shown to have a debilitative impact on golf performance in further research, including Bawden, Maynard and Westbury (2001) who showed golfers who scored highly on self-consciousness were more likely to suffer performance breakdown on a putting task than those who scored lowly.

The findings in the current study also display consistency with Wulf (2013) that an internal focus of attention can hinder performance. Within the selection of a target ironic processing (Wegner, 1994) was also seen to occur as one of the golfers recalled an instance of a missed putt where ironic processing took place:

> But as stupid as it sounds there are times when you are hitting your shot and in the backswing you are thinking 'don't go right, don't go right', and you just end up hitting it way over right!

Ironic processing has been shown in a number of self-paced sporting tasks, including golf (Wegner et al., 1998). This impacts the self-instruction and target selection undertaken by the golfer, it is important that an external target is selected and that performers abstain from avoidant instructions to direct concentration towards targets more facilitative of positive performance outcomes.

Pre-shot routine.

According to the golfers, an integral part of attentional control was their ability to implement a pre-shot to trigger concentration. Consciously monitoring the pre-shot routine and ensuring each part is fulfilled can counter potential distractions that may have arisen:

> I put the bag down that's me in my pre-shot routine and I'm starting to take into consideration everything around this specific shot, so for me it's at that point it's almost a signal, that's me started... So, something like that having a bit of a signal is

618 quite good I think, because it's a clear barrier…if…distracted…say 'right back to the
619 start'.

620 Research indicates that pre-performance routines have an important function for attention in
621 sport, allowing an athlete to deal with distraction (e.g., Boutcher & Crews, 1987), focus
622 attention (e.g., Cotterill, Sanders, & Collins, 2010), and act as a trigger (Boutcher & Crews,
623 1987; Moran, 1996). Moreover, research (Cotterill et al., 2010; Jackson, 2003) also
624 emphasises the importance of maintaining consistency within pre-shot routines as this is
625 something that remains stable across scenarios and a source of permanence a golfer can go to
626 in an ever changing unpredictable environment. The findings of the present study indicate
627 that the establishment of a consistent pre-shot routine, and successful implementation of it,
628 serves as an imperative function for attentional control and the prevention of succumbing to
629 distraction.

630 **Post-shot routine.**

631 Post-shot routines were indicated to be a vital component and in the process of meta-attention
632 because it reduces distractibility. Previous literature outlines the function of the post-shot
633 routine as a facilitative space for evaluation of the shot played (Finn, 2009). Present findings
634 show following a short period of evaluation the golfer then switches off by diverting attention
635 elsewhere to something non-task specific. This is demonstrated by the following comment
636 from one of the participants interviewed:

637 …after that [the shot] I would walk into my neutral box, reflective box where I would
638 evaluate the process and the outcome, put the club in the bag and as soon as I walked
639 away from that zone I wouldn't think at all, I would bring my eyes up and just enjoy
640 it…

641 The post-shot routine facilitates self-regulatory behaviours, such as emotion regulation,
642 allowing the golfer to approach the next hole without baggage of frustration, or other

negative appraisals. The switch off is the diversion of attention away from task relevant thoughts, similarities can be made with Nideffer and Sagal (2006) who indicated analysis would take place prior to a shift to a broad external focus before the next shot. The period of *switch-off* between shots can be facilitated by others where positive relationships were present. Similar results were indicated in research by Davies, Collins and Cruickshank (2017) who noted the contribution of caddies in the control of attention between shots.

Substantive Grounded Theory

In sum, concentration in golf occurs if a performer positively perceives their attentional resources and successfully implements consistent control routines. Resources are needed at different times, and if missing or depleted when they are required the negative appraisal becomes an internal distraction reducing the accuracy of concentration. Positively perceived resources are facilitative of performance. Thus, it is the interaction between the golfer and their resources that determine whether they produce optimal attention control, i.e., focused attention (concentration), or if they succumb to cognitive distractions, i.e., divided attention. Rather than promoting one factor, the grounded theory depicts numerous factors that interact, and are critical at different times building a golfer's attentional control. Meta-attention is conceptualised as a bottom-up process with attentional metacognitions building towards attention control. In golfers, meta-attention reflects how a golfer assesses and uses attentional resources to create accurate attentional control.

General Discussion

The present study developed a grounded theory of meta-attention among golfers to explore and explain the processes that lie behind concentration and internal distractibility during a sports performance. It is hoped the findings can provide theoretically driven interventions to aid concentration in sports performers. Findings advance the current held understanding of meta-attention in sport (e.g., Miller & Bigi, 1979: Moran, 1996), providing a data-driven understanding of the internal resources that help a golfer concentrate during performance. Concentration in golf was reported to occur following a positive evaluation of attentional resources and the successful implementation of attentional control.

Applied Implications

The novel understanding of meta-attention created in this study possesses several applied implications. First, the grounded theory presents a model depicting meta-attention and its processes that can be used by golfers and support staff to understand attention and potential sources of distractibility and the influence it has on attempts to control attention. These resources can be drawn on when they are required to avoid internal distraction. One way to enhance concentration is to teach performers to avoid using binary evaluations of their resources (i.e., positive or negative). To achieve this it may be worthwhile for golfers to be 'mindful' (e.g., Birrer, Röthlin, & Morgan, 2012) because this emphasis might reduce internal distractibility brought about by negative evaluations. The encouragement of being mindful may have greater pertinence to golfers in the early stages of their careers as, for example, these golfers are less likely to have a wide and established support network around them.

In addition to mindfulness training, golfers should seek to establish consistent pre- and post-shot routines. If a consistent pre-shot routine is established golfers are able to offset potential

distractions that have occurred, and control their attention. In line with previous literature pre- and post-shot routines are suggested to act as a *switch on* and *switch off* of concentrated attention (e.g., Boutcher & Crews, 1987). Therefore, implementing the establishment of pre- and post-shot routines within a training environment is likely to be beneficial to performers for their attentional control, i.e., facilitating concentration, within competitive settings.

Study limitations and suggestions for future research

There are strengths and weaknesses within the current study. The methodological congruence ensured that grounded theory was applied appropriately and thoroughly from start to finish (Weed, 2009). To our knowledge, this is the first model of its kind that seeks to understand meta-attention in a sporting context and provide a theoretical explanation for concentration and internal distractibility in a sporting sample. Although using competitive-elite and successful-elite performers provides this study with reasonable strength, a sample consisting of wholly 'successful elite' or 'world-class elite' (Swann et al., 2015) would further enrich the insights into the operation of meta-attention within a sporting context, as these performers are likely to possess even greater metacognitive proficiency (MacIntyre et al., 2014). It is likely variations in meta-attention are present between golf and other sports, in particular those that are externally paced and use open motor skills. Additionally, by using an exclusively male sample it remains unclear whether the findings in the present study are generalizable to females. Thus, the findings and the implications from the present study are likely limited to male golfers.

Several avenues for future research arise from this study. First to gain further insights into the meta-attentional process, a study that adopts a Think Aloud Level 3 (Ericsson & Simon, 1993) methodology could prove to be suitable line of enquiry because this method would

capture meta-attentional thoughts as they occur. Additionally, researchers could explore meta-attention across different sports and possible variations in meta-attention. Given the golf specific sample within this study, a similar grounded theory study could be fulfilled within a different sporting sample. Moreover, as per Straussian grounded theory (Corbin & Strauss, 2008), the theory of meta-attention created in the current study is open to extension and update with new knowledge. Thus, future research could seek to further extend our understanding of meta-attention in golf.

In summary, the present study has developed the first theoretical understanding of meta-attention using competitive golfers. In addition to increasing theoretical knowledge, the study possesses practical implications by equipping psychologists, coaches and performers with a model to understand attentional processes and recourses to best facilitate concentration, and where sources of internal distractibility can arise. Specifically, the present findings may be used to drive interventions that seek to manage internal distractions, increasing the golfer's concentration.

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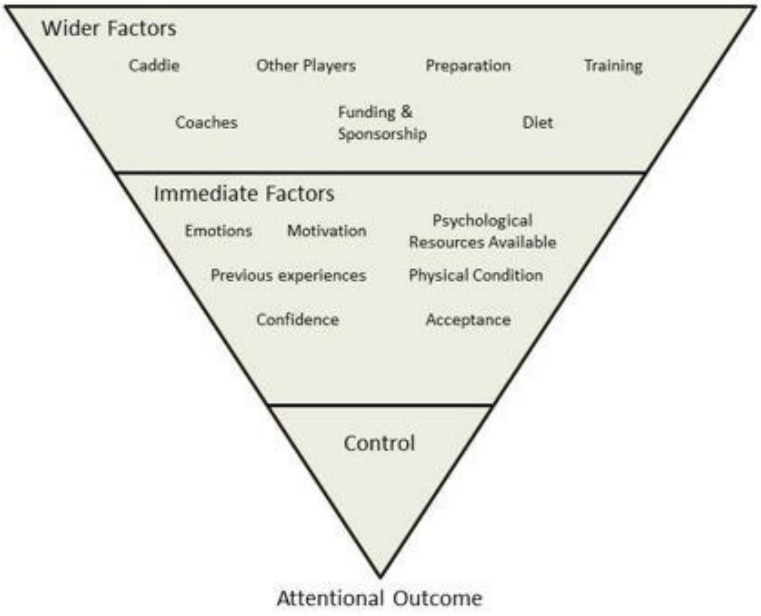
Figure 1. An early draft of a Grounded Theory model of Meta-attention in golf

Figure 2. A Grounded Theory model of Meta-attention in golf



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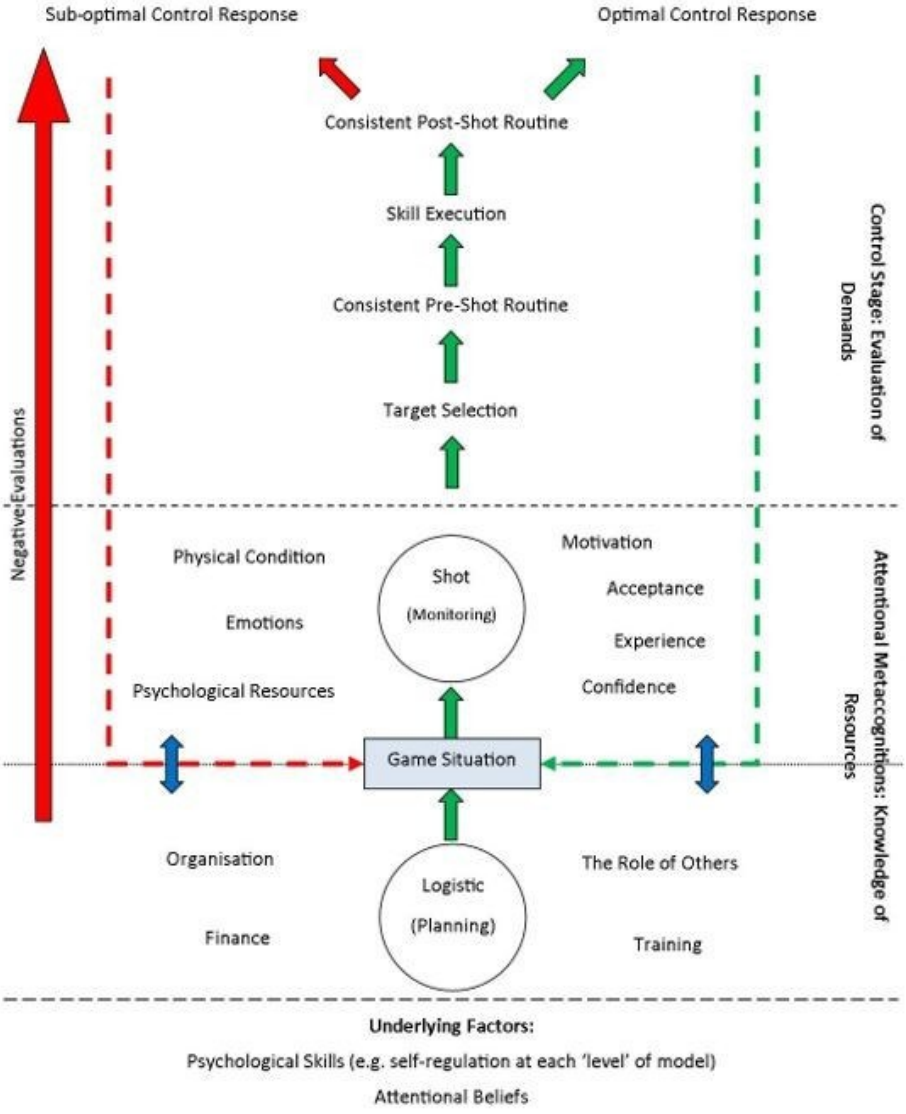

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